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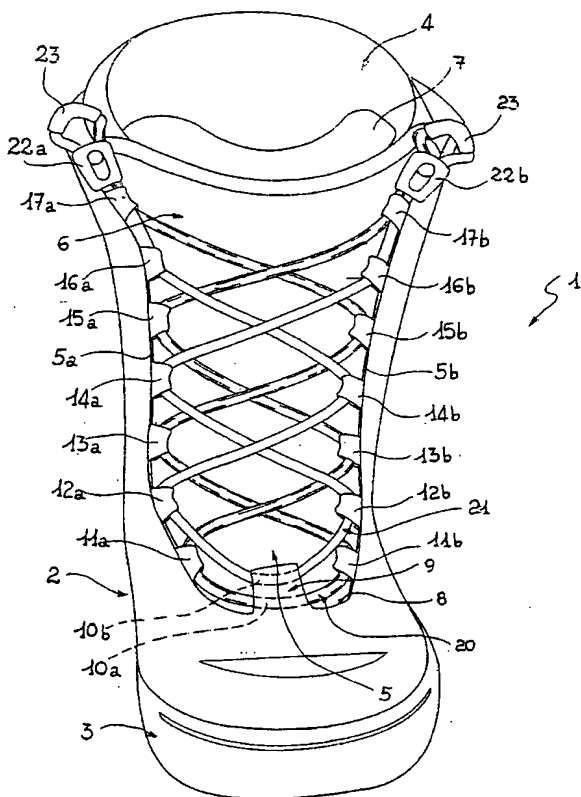
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(54) Title: FOOTWEAR WITH A LACE FASTENING



(57) Abstract: Footwear (1) with a lace fastening comprises an opening (5) with a first edge (5a) and a second edge (5b) which are juxtaposed and each of which carries a respective plurality of lacing eyes, and at least two laces (20, 21) extending through respective pairs of the lacing eyes (11a,b - 17a,b). The ends of both of the laces converge on both of the edges of the opening, with at least one end of each lace (20, 21) extending through a respective end lacing eye (17a, 17b) of the fastening provided on each of the opposite edges.

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## Footwear with a lace fastening

### Technical field of the invention

The subject of the present invention is footwear with a lace fastening of the type described in the preamble to the main claim. Footwear including  
5 these characteristics is known from US 2003/0051374 A1.

### Background Art

A field of particular interest for the application of the invention is that of sports boots such as snow-boarding, trekking, and skating boots and the like, which have uppers that are quite stiff and elongated and the fastenings of  
10 which have to satisfy the conflicting requirements of quick and effective tightening and equally quick and effective loosening. However, the technical teachings provided by the invention are applicable to footwear of different types with preferred use in boots which require a fairly long fastening and a fairly stiff upper.

15 Amongst the known advantages of lace fastenings is that of creating a homogeneous closure for the foot along the entire extent of the edges of the access opening of the footwear. However, to achieve this, each of the edges of the footwear must carry a respective plurality of lacing eyes arranged fairly close together. Arranging the lacing eyes close together, however, leads to an  
20 increase in the angle formed by the lace as it extends into and out of the eyes, which in turn causes greater friction between the lace and the lacing eyes. For this reason, it is not generally possible to fasten (or, on the other hand, to loosen) the fastening simply by exerting a pull on the ends of the lace, but it is necessary to pull on intermediate portions of the lace in order to distribute the  
25 pulling load along the entire fastening. Lacing-eye devices and members of particular shapes and designs have been investigated to minimize the effects of the friction between the lacing eyes and the lace. For example, lacing eyes provided with pulleys, with resin inserts having a low coefficient of friction, or with curved profiles have been produced but, in parallel with possible  
30 advantages in terms of the ability of the lace to slide, all these involve other disadvantages. In particular, these special devices are bulky and/or delicate and therefore respond poorly either to the need for strength for heavy uses and/or for use in difficult environmental conditions, or to the more typically

decorative requirements of the footwear. Moreover, their efficacy in reducing the above-mentioned friction is only partial, to the extent that it is not normally possible, even with relatively short fastenings, to tighten the footwear simply by pulling on the ends of the laces.

5 US 2003/0034365A1 and US 6467195 describe sports footwear with lace fastenings in which the two ends of the lace converge in a grip for preventing soreness of the user's hand during the tightening of the fastening.

US2003/0051374 A1 describes a double-lace fastening in which all of the ends of the laces extend through a single edge of the fastening and  
10 converge in a strap which in turn can be fixed releasably to the footwear upper beyond the opposite edge. This fastening is suitable exclusively for shoes with a limited number of lacing eyes since it does not permit a high lacing tension to be exerted on the ends of the laces. It also causes non-homogeneous lacing tensions on the two laces since they follow different paths and are of  
15 different lengths. In practice, various shapes of users' feet cause a different length of lace to be engaged in the lacing eyes according to the position occupied along the opening to be closed so that, once the fastening is closed, the free ends of the laces are not necessarily of equal length.

#### Disclosure of the invention

20 The problem underlying the present invention is that of providing footwear the fastening of which is designed structurally and functionally to prevent all of the problems discussed with reference to the prior art mentioned.

This problem is solved by the invention by footwear formed in  
25 accordance with the appended claims.

#### Brief description of the drawings

The characteristics and the advantages of the invention will become clearer from the detailed description of a preferred embodiment thereof which is described by way of non-limiting example with reference to the appended  
30 drawings, in which:

- Figure 1 is a front elevational view of a boot according to the invention with the fastening open,

- Figure 2 is a front elevational view of the boot of Figure 1 during the closure of the fastening,
- Figure 3 is a front elevational view of the boot of Figure 1 with the fastening closed, and
- 5 - Figure 4 is a schematic view of a variant of the boot according to the invention with a different threading of the ends of the laces.

Best modes for carrying out the invention

In the drawings, a boot formed in accordance with the present invention is generally indicated 1. The boot 1 is of the type used for the sport of snow-  
10 boarding but the invention is applicable equally effectively to the production of footwear of other types.

The boot 1 comprises an upper 2 with a sole 3 and an opposed entrance 4 for the fitting-on of the boot. An opening 5 is formed in the upper 2 and has juxtaposed edges indicated 5a, 5b. A tongue 6 extends from the lower end 8  
15 of the opening 5 as far as the entrance 4 and is optionally provided with padding 7. A lacing eye 9 with two channels 10a,b is provided in the opening 5 in the region of its lower end 8.

Respective pluralities of lacing eyes 11a,b, 12a,b, 13a,b, 14a,b, 15a,b, 16a,b, 17a,b are fitted in corresponding and facing positions on the respective  
20 edges 5a, 5b (by convention, the lacing eyes on the edge 5a are marked with the letter "a" and the lacing eyes fitted on the edge 5b with the letter "b"). The lacing eyes 17a,b will be referred to below as the end lacing eyes of the fastening.

A first lace and a second lace, indicated 20 and 21, respectively, are  
25 engaged in the lacing eyes 9 and in the further lacing eyes 11a,b to 17a,b in the manner indicated below. The ends of the laces, 20, 21, meaning the portions of the laces which extend beyond the end lacing eyes 17a,b, are also engaged in respective locking devices 22a,b, for example, of the constricting type.

30 The two laces 20, 21 extend through alternate lacing eyes of the two series of lacing eyes in a manner such that, between two lacing eyes of the same edge through which the first lace extends, there is at least one lacing eye of the same edge through which the second lace extends. Both of the

laces 20, 21 also extend through respective channels 10a, 10b of the lacing eye 9 and through the two end lacing eyes 17a,b of the fastening. In the embodiment of Figures 1 to 3, the first lace 20 is therefore engaged in the lacing eyes 9, 11a-b, 13a-b, 15a-b and 17a-b, crossing between the lacing eyes 11-13, 13-15, and 15-17 (a-b). The second lace 21 is in turn engaged in the lacing eyes 9, 12a-b, 14a-b, 16a-b and 17a-b, crossing between the lacing eyes 12-13 and 14-16 (a-b). At the exit from the fastening, a corresponding end of each of the two laces is led through a respective end lacing eye.

In the embodiment of Figure 4, both of the corresponding ends of the same lace are led through the same end lacing eye 17a,b so that both ends of the first lace are led through the end lacing eye 17a and both the ends of the second lace are led through the opposite end lacing eye 17b. In this second embodiment, it is necessary to provide a further return lacing eye 18 between the lacing eyes 16 and 17.

Since the portions of each lace engage alternate lacing eyes, for a given "closeness" of the lacing eyes, a smaller angle is formed where the lace extends into and out of the respective lacing eye, resulting in less friction between the laces 20, 21 and the lacing eyes.

The sliding of the laces through the lacing eyes is thus considerably facilitated without, however, prejudicing the uniformity of the fastening tension. This characteristic, together with the fact that the lace tensioning function is distributed over two separate laces and is consequently halved in comparison with conventional fastenings, makes it possible to close the entire fastening simply by exerting a pull on the ends of the laces, without distributing the tightening load manually over intermediate portions of the fastening (that is, without "pulling" the intermediate loops of the laces manually). Since corresponding ends of the two laces converge on opposite edges of the opening 5, the laces can be tensioned independently of the shape of the foot, or of the extent of the opening 5. Moreover, the fastening can be closed to the desired tension in a pulsed manner, that is, by firstly exerting a greater tension on one pair of ends of the laces, for example, those converging on the right-hand edge of the upper and then a corresponding greater tension

on the other pair of ends converging on the left-hand edge, alternating the pulls applied and overcoming the friction to the best possible extent.

According to another characteristic of the invention, the free ends of the laces 20, 21 are joined together at the ends to form a closed loop in which the  
5 joined ends of the laces form respective grips 23 for facilitating the pulling and tightening of the fastening. This arrangement enables the fastening to be closed even when wearing gloves and in any case by exerting a more effective pull without painfully stressing the fingers, as shown in Figure 2.

Moreover, with the boot thus designed, there is no longer any need to  
10 close the fastening progressively so that the use of open (generally hook-shaped) lacing eyes is superfluous. Since closed lacing eyes can be used (in the embodiment shown lacing eyes of the type with a tape loop sewn to the upper are shown) the laces remain engaged therein even when the fastening is loosened which makes it possible to wear the boot and walk in it with the  
15 laces fully loosened, without the free ends hampering movement.

Although, on the one hand, to fasten the footwear, it suffices to exert a tension on the ends of the laces by means of the grips 23 and to lock the constricting locking devices, on the other hand, the operation to loosen the footwear is just as quick and easy and requires purely loosening of the  
20 constricting locking devices in order for the lace to slide through the lacing eyes with little friction, reducing the fastening load.

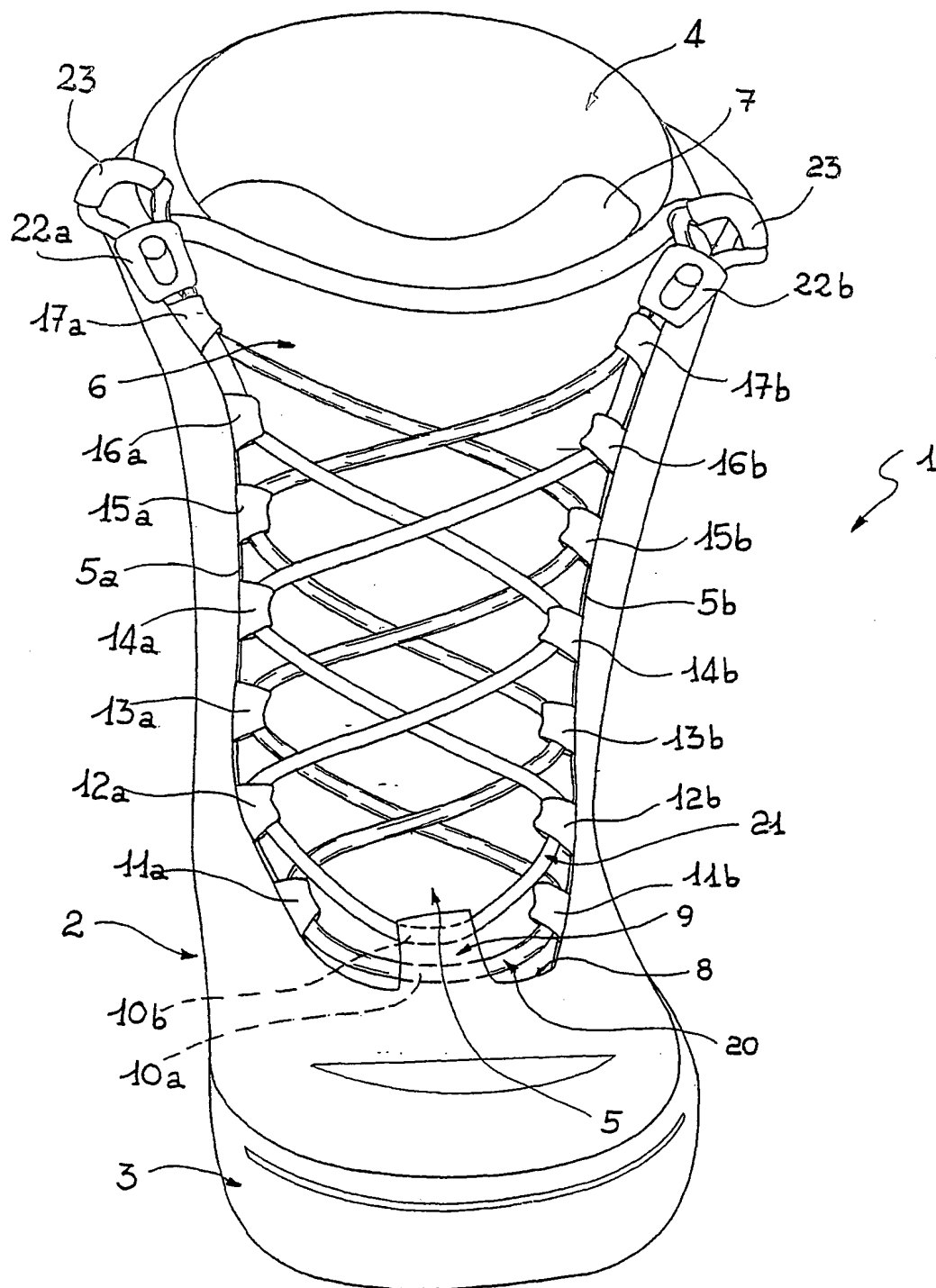
Finally, to prevent undesired loosening of the fastened boot and to prevent the hindrance due to the free ends of the laces, when the fastening is tightened, the two ends can be knotted together as shown in Figure 3.

25 The boot may be equipped with two or more laces, arranged with different alternating arrangements in the lacing eyes. Moreover, the constricting locking devices may be fixed to the upper or may be free relative thereto.

## CLAIMS

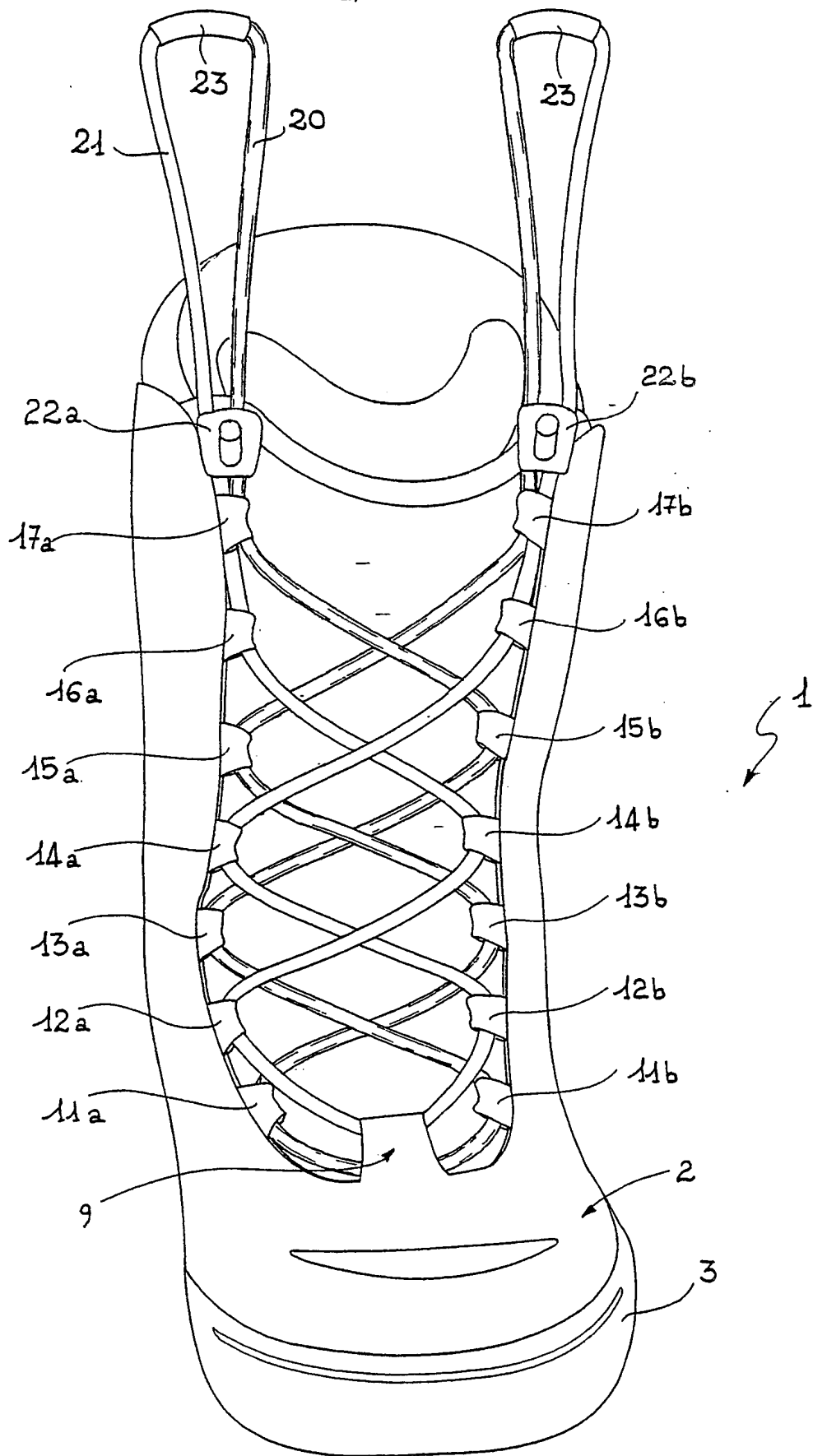
1. Footwear with a lace fastening comprising an opening (5) with a first edge (5a) and a second edge (5b) which are juxtaposed and each of which carries a respective plurality of lacing eyes, and at least two laces (20, 21) extending through respective pairs of the lacing eyes (11a,b-17a,b), characterized in that the ends of both of the laces converge on both of the edges of the opening, with at least one end of each lace (20, 21) extending through a respective end lacing eye (17a, b) of the fastening provided on each of the opposite edges.
2. Footwear according to Claim 1 in which the corresponding ends of each lace (20, 21) converge in respective and separate grips (23).
3. Footwear according to Claim 1 or Claim 2 in which the laces are led through alternating lacing eyes of the respective pluralities of lacing eyes in a manner such that, between two lacing eyes (11a - 13a; 13a- 15a; 15a-17a) of the same edge through which a first of the laces extends, there is at least one lacing eye (12a, 14a, 16a) of the same edge through which a second of the laces extends.
4. Footwear according to one of more of the preceding claims in which the lacing eyes are of the closed-eye type.
5. Footwear according to one or more of the preceding claims in which means (22a, 22b) are provided for locking the laces and are active independently on each pair of the respective ends of laces converging in the same grip.
6. Footwear according to Claim 5 in which the locking means are of the constricting type.
7. Footwear according to Claim 5 or Claim 6 in which the locking means are provided in the region of the respective end lacing eyes.

1/4  
Fig. 1

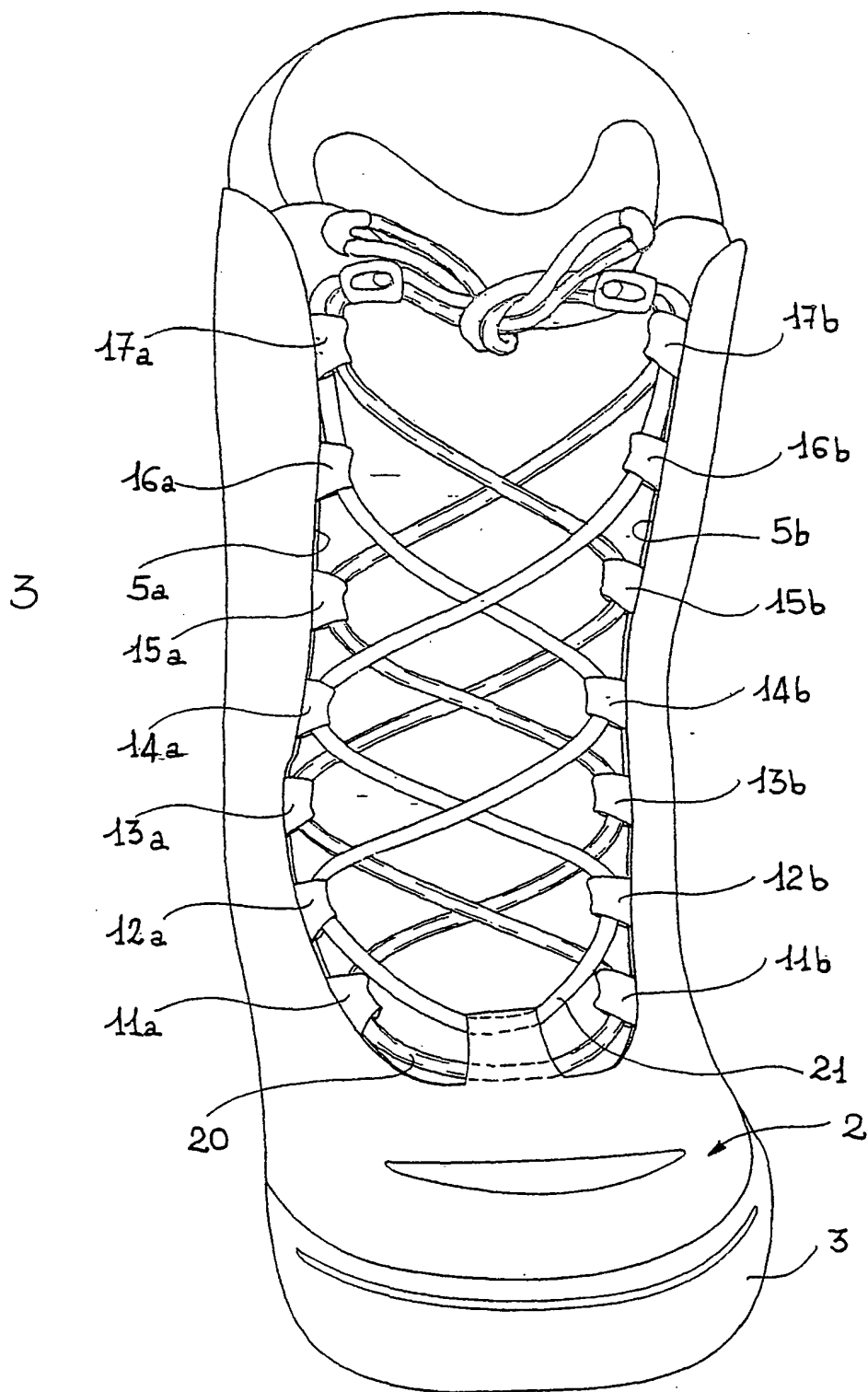


2/4

Fig. 2



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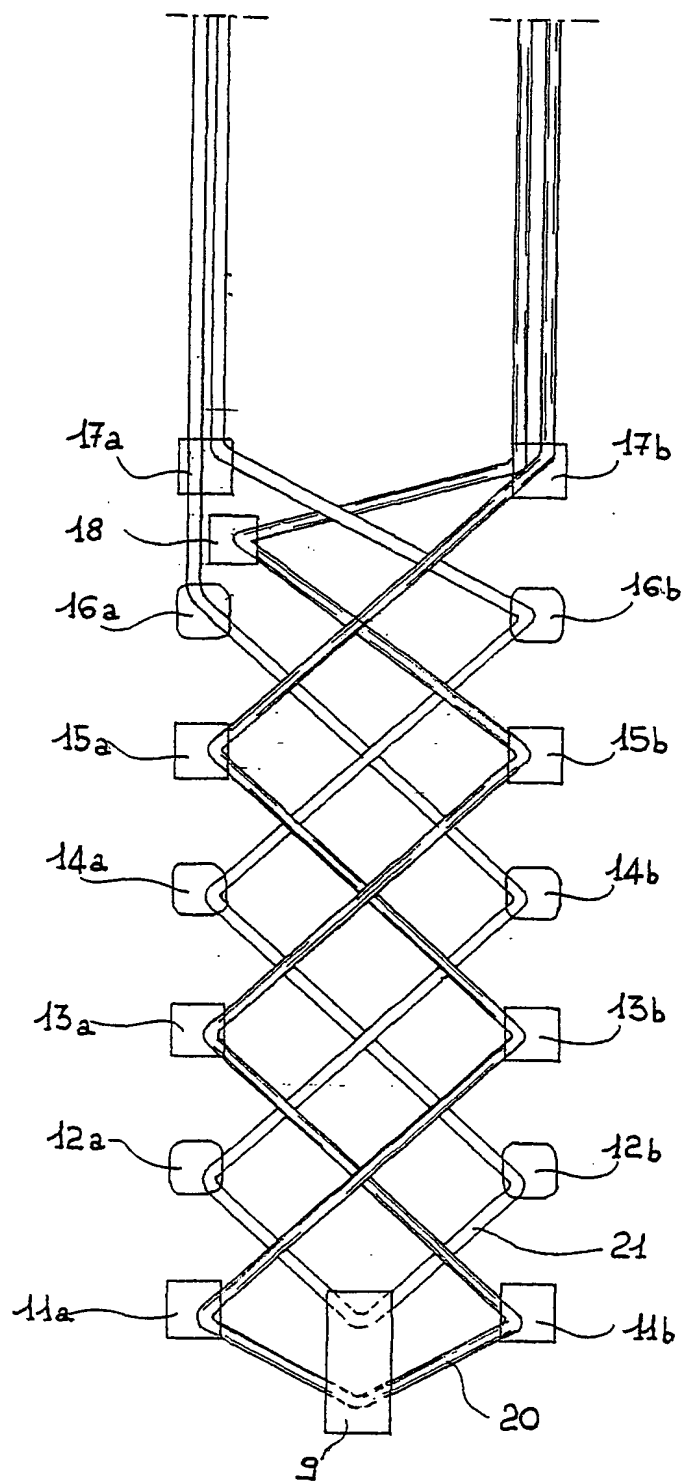


Fig. 4

# INTERNATIONAL SEARCH REPORT

Int lonal Application No  
PCT/EP2004/001684

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A43C1/00 A43C7/00 A43B5/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A43C A43B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003/051374 A1 (FREED ANNA B) 20 March 2003 (2003-03-20) cited in the application paragraph '0074! - paragraph '0080!; figures 6C-6L	1
A	US 2003/041478 A1 (LIU KUN-CHUNG) 6 March 2003 (2003-03-06) paragraph '0021! - paragraph '0023!; figure 6	1
A	EP 0 723 746 A (NORDICA SPA) 31 July 1996 (1996-07-31) column 2, line 18 -column 3, line 30; figures	1
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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